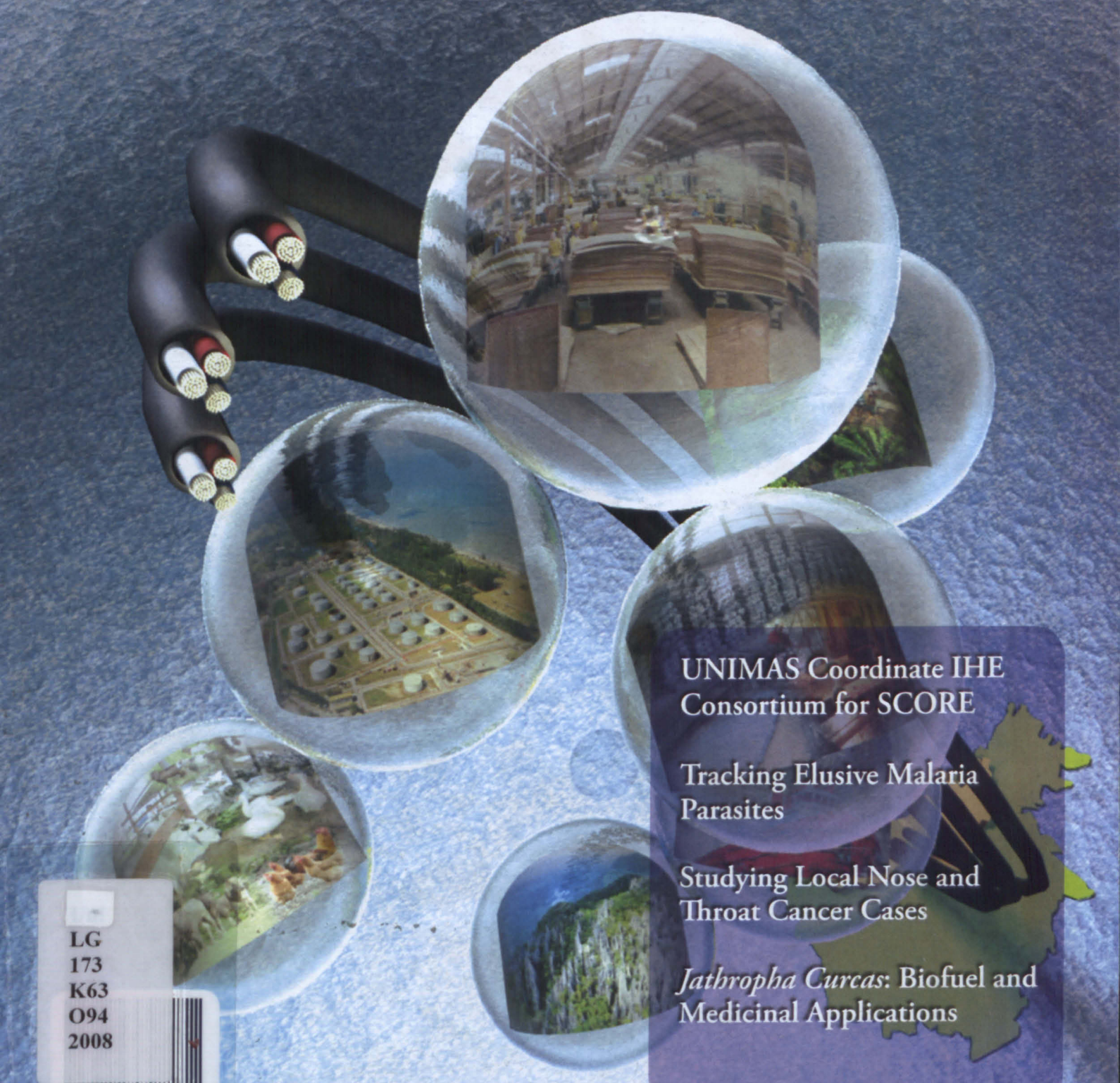
OUTREACH

UNIMAS RESEARCH BULLETIN | Vol. 2 No. 2 | AUGUST 2008

ISSN : 1985-2053



UNIMAS Coordinate IHE Consortium for SCORE

Tracking Elusive Malaria Parasites

Studying Local Nose and Throat Cancer Cases

Jathropha Curcas: Biofuel and Medicinal Applications

FAST FACTS on UNIMAS

Date Incorporated	24th December 1992	
Location	Kota Samarahan, Sarawak, Malaysia (about 25 km from the city of Kuching, the capital city of Sarawak)	
Vice Chancellor	Prof Dr Khairuddin Ab Hamid	
Student Enrolment 2008/2009	Undergraduate	6427
	Post-graduate	675
	Total	7102
Staff Population	Academic	662
	Management & Support	1128
	Total	1790

Faculties

Faculty of Applied and Creative Arts
Faculty of Cognitive Sciences and Human Development
Faculty of Computer Science and Information Technology
Faculty of Economics and Business
Faculty of Engineering
Faculty of Medicine and Health Sciences
Faculty of Resource Science and Technology
Faculty of Social Science

Centres

Centre for Academic Information Services
Centre for Applied Learning and Multimedia
Centre for Information and Communication Technology Services
Centre for Language Studies
Centre for Student Development
Centre for Technology Transfer and Consultancy
Research and Innovation Management Centre

Institutes

Institute of Biodiversity and Environmental Conservation
Institute of East Asian Studies
Institute of Health and Community Medicine (IHCM)

Centres of Excellence

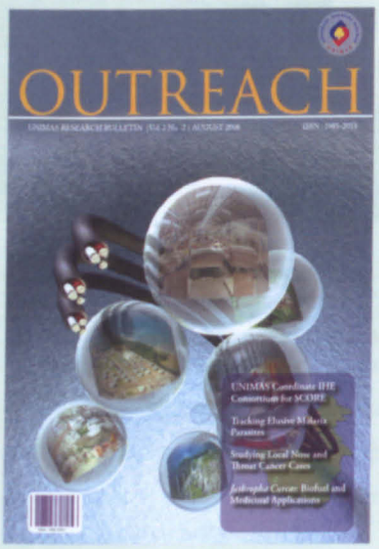
Centre for Image Analysis and Spatial Technologies
Centre for Rural Informatics
Malaria Research Centre
Centre for Water Research

International Linkages

54 international partnerships

Centre for Academic Information Services (CAIS)

Volume of Books	121,951
Set of Media Materials	8,036
Journal Titles (Print and Electronic)	18, 458



Introduction to This Issue

University-Industry engagement, particularly in R&D, has long been a tradition that has tremendously benefitted both entities in their respective pursuits of socially and economically relevant knowledge, technology and tangibles. For universities, such collaboration would spur, among others, development of practical knowledge which builds and strengthens their teaching-learning and research endeavours.

On this basis, UNIMAS resolves to participate actively in complementing the planning and development needs of the recently launched Sarawak Corridor of Renewable Energy (SCORE) project. Our role in this initiative has added significance as the Ministry of Higher Education has assigned UNIMAS the task of coordinating the involvement and input of all the Sarawak-based IHE, both public and private (acronymed as U-SCORE), in SCORE development. An important output expected of this collective effort would be a comprehensive database on the SCORE-related human capital, R&D and other services. These would be made available by member institutions to aspiring tenants of SCORE.

In this context, the Editorial Committee is proud to dedicate this particular issue of OUTREACH to the SCORE project.

Thank you.

Chairperson, Editorial Committee

TABLE OF CONTENTS

RESEARCH NEWS

In the World News

The Malaria Research Centre of Universiti Malaysia Sarawak (UNIMAS) found itself in Reuters and Bloomberg through the discovery of severe cases of malaria infections in human which have evaded clinical detection (Refer to the Research Highlights).

Sarawak Dolphin Conservation

Good news for the dolphins in Sarawak! The Sarawak Dolphin Project is underway to ensure their survival. Through a concerted effort by Sarawak Shell Berhad, Institute of Biodiversity and Environmental Conservation (IBEC), UNIMAS and Sarawak Forestry Corporation (SFC), the project will collect baseline data on the seasonal distribution, habitat use and population density for the dolphins in Sarawak and will thereon recommend appropriate conservation plan for this threatened marine animal. A sum of RM 160,000 has been pledged by Sarawak Shell Berhad to support the project's research activities.

UNIMAS R & D Expo2008

The 2nd Annual R&D Exposition was held on 5-7 March 2008 at the CAIS Exhibition Centre, UNIMAS with the theme "R & D towards Wealth Creation". R & D products by UNIMAS staff and students were showcased and a few were selected to represent UNIMAS at both national and international expositions. The exhibits included products from environmental engineering, medical research, creative design, spatial imaging, and augmented reality systems.

Coordination of IPTA-IPTS input for SCORE

UNIMAS has been given the task to coordinate the contributions of the educational institutions to the Sarawak Corridor of Renewable Energy (SCORE). A seven-institution consortium, U-SCORE, was formed to uphold the task: UNIMAS, Universiti Teknologi MARA (UiTM) (Samarahan Campus), Universiti Putra Malaysia (Bintulu Campus), Curtin University of Technology (Sarawak Campus), Swinburne University of Technology (Sarawak Campus), Kuching Polytechnic and Mukah Polytechnic. Through its first meeting on 21-22 April 2008, the consortium has decided on its modus operandi and have identified three major areas to focus on in support of SCORE, namely, human capital development, R&D and consultancy services.

Studies on Solid Waste Management in Sarawak

An MoU was signed between UNIMAS and Sarawak Waste Management Sdn. Bhd./ Trienekens (Sarawak) Sdn. Bhd. on 30 April 2008. The purposes of the MoU were to establish a long-term platform for research collaboration between the three organisations, develop expertise in waste management and treatment, and to generate new technologies and approaches for a sustainable management of solid wastes in Sarawak. The collaborative research will kick off with two projects i.e. solid waste characterisation studies in major towns of Sarawak, and survey of public perception on the quality of services by Trienekens. Trienekens (Sarawak) Sdn. Bhd. has also agreed to provide a research grant of RM300,000 to fund the two projects over a period of two years.

CIPTA '08: Infinart

Infinart, a juxtaposition of Infinity and Art, was the theme for CIPTA '08. It was held from 11-19 April 2008. This annual exhibition showcased artistic products and designs of final year students of the Faculty of Applied and Creative Arts, UNIMAS. Apart from the various art displays and performances were seminars given by the country's well known personalities such as Dato Sean Sulong, U-Wei Haji Shaari, Tan Sri Datuk Jins Shamsuddin, and Datin Seri Tiara Jacquelina.

Wastewater and Environmental Management

A memorandum was recently forged between Sanmina-SCI Corporation (M) Sdn Bhd and UNIMAS The focus of this partnership is on waste water and environmental management, including sharing of scientific equipment for analytical work and capability building purposes.

The documents was signed by SSCI Managing Director, Mark Gable and Director of Engineering, Bill Nicolai and UNIMAS's Vice-Chancellor, Prof Dr Khairuddin Ab Hamid and Deputy Vice Chancellor (Research and Innovation) Prof Dr Murtedza Mohamed; and witnessed by Deputy Chief Minister Datuk Patinggi Tan Sri Dr George Chan Sanmina-SCI is a producer of multi-layer circuit boards that involves more than 50 processes comprising electrical, chemical, mechanical, optical and quality-testing processes. In 2007, it exported RM304.5 million worth of printed circuit boards. SCCI is located in the Sama Jaya Industrial Zone, Kuching, and employs more than 1,400 workers. At the MOU signing ceremony, the SCCI Managing Director, Mark Gable, announced that the corporation had, under the MoU, came up with a special scholarship programme for Master's level (worth RM10,000 each) which will be offered to two top engineering students in UNIMAS.

Inter-agency Dialogue on Peat Research

An inter-agency dialogue focusing specifically on the future direction of peat research in Malaysia in general and Sarawak in particular was held at UNIMAS on 21 July 2008. Among the 12 key researchers and stakeholders present were Datuk Sabri Ahmad, Chairman of Malaysian Palm Oil Board; Mr Chaiti Bolhassan, Permanent Secretary of the Ministry of Land Development of Sarawak; Prof Murtedza Mohamed and Prof Wan Sulaiman Wan Harun of UNIMAS; and Dr Lulie Melling of Agriculture Research Institute of Sarawak.

The meeting started with a short briefing on the four EU-funded projects participated by UNIMAS, namely STRAPEAT, PEATWISE, RESTORPEAT and CARBOPEAT. This was followed by discussion on issues and options related to the development of peatland, with particular emphasis on its utilisation for oil palm plantation.

While they acknowledged the eventual inevitable loss of peatland resources due to peatland reclamation for agro-industrial uses, the dialogue partners regretted the distorted perceptions and over-generalisation of impacts presented by certain quarters.

The consensus of the special dialogue included calls for dialogue partners and other Malaysian research bodies (such as MARDI) to collaborate more closely in their research activities to maximise the outcome and impacts, as well as avoid research duplications; a joint identification of short, medium and long-term research focus; and the need to attend to major gaps in knowledge, where the data is urgently needed to bridge uncertainties and correct misperceptions. All agencies agreed to cooperate and collaborate closely through the Tropical Peat Research Institute established under the Ministry of Plantation Industries and Commodities.

RESEARCH HIGHLIGHTS

Sustainable Management of Sarawak Peatland

Researchers: Professor Dr Wan Sulaiman Wan Harun, Professor Dr Murtedza Mohamed, Professor Dr Peter Songan, Associate Professor Dr Gabriel Tonga, Associate Professor Dr Isa Ipor, Dr Petrus Bulan, Sim Siong Fong and Hafsah Nahrawi.

Many Malaysians have probably never thought of peatland as a climate regulator other than unviable sites for housing development. The roles of peatland as a buffer against flood, a reservoir of biodiversity, a water source and a provider of timber and non-timber products are well documented in research. Much of peat swamp forests are now being reclaimed for agricultural use without proper agronomic and environmental management. For example, Sabah has lost almost half of its peatland (86,000 ha in 1989 and 46,000 ha in 1999).

The sustainable management of 1.7 million hectare of tropical peatland in Sarawak is the concern that drives the UNIMAS peatland research group to study the impact of peat swamp forest clearance and drainage for agriculture, mitigation of the impact particularly in prolonging the agronomic life of the peat and reduction of greenhouse gas emissions.

When peat swamp forests are cleared for agricultural use, the waterlogged land is drained to grow particular crops. The drainage brings the carbon in the peat into contact with oxygen, producing carbon dioxide and other greenhouse gases. Eventually, the drainage of water from the peatland results in the peat surface subsiding to the same level as the natural groundwater table of the surrounding areas, leading to flooding.

The UNIMAS peatland research group is investigating various aspects related to the sustainable management of the tropical peatland, beginning with the characterization of the peat soils. Much has been discovered about the humification process, carbon dynamics, estimation of the extent of carbon storage and effects on water quality in the peat soils.

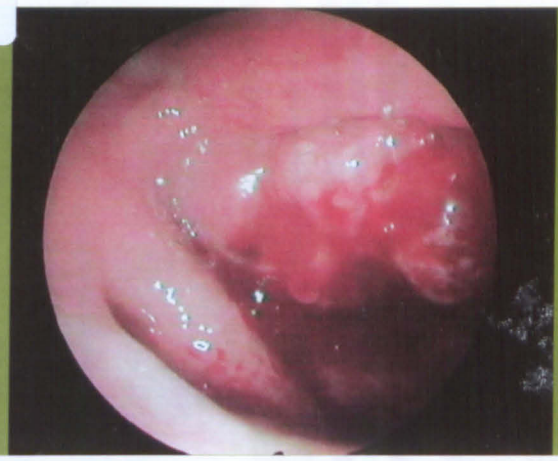
A recently published study on peat humic substances by UNIMAS researchers revealed that the tropical peat of Sarawak has higher carboxylic and phenolic contents, is richer in carbohydrate moiety and is also more oxygenated. The smaller-sized humic molecules and dominant aliphatic components indicated that the tropical peat of Sarawak has greater potential as a natural sink of pollutants. Their findings have also showed that the agronomic life of the peatland can be sustained or prolonged by adopting the right choice of crop mix with controlled drainage.

Controlling drainage to ensure regular fluctuation of the water table is of utmost importance to offset peat decomposition. Carbon loss is tremendous in waterlogged conditions of deep peat. For sago planting, simple techniques such as pruning and desuckering were found to produce bigger trunks. These research findings have significant implications on sustainability of commercial sago production in deep peat.

Besides studying the ecology of peatland, the group is also studying how the degradation of the peatland affects the lives of the surrounding inhabitants. A survey of 300 respondents from seven villages in the Mukah watershed is underway. The outcome of the study will provide recommendations to the government on how to further develop and sustain the livelihood of these local communities.

Nose and Throat Cancer in Sarawak

Researchers:
Associate Professor Dr Edmund Sim, Assocociate Professor Dr Samirah Abdullah and Associate Professor Dr. Tiong Thung Sing.



Clinically, nose and throat cancer is referred to as nasopharyngeal carcinoma (or NPC, in short). It is a cancer that occurs in the uppermost part of the throat that connects the back of the nose to the back of the throat. This type of cancer has high occurrence in Southeast Asia, with the Chinese constituting 72% of reported cases. However, in Sarawak, preliminary studies by UNIMAS researchers and reported findings by others have revealed higher incidence of this cancer in the indigenous group compared to other major races.

> *" The suspected causes of NPC are tied to many factors, for example, dietary habits, smoking, environmental pollutants, genetic background and viral infection."*

The suspected causes of NPC are tied to many factors, for example, dietary habits, smoking, environmental pollutants, genetic background and viral infection. In order to understand the occurrence and mechanism of NPC, the UNIMAS cancer research group uses biotechnology and knowledge from clinical studies to study the disease.

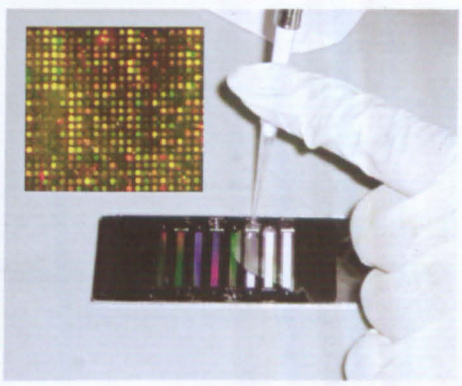
Their research has led to the identification of genes which have previously never been linked to NPC; and the identification of possible mechanism of abnormal chromosome formation in cells derived from this type of cancer. These exciting discoveries would enable scientists to use definitive NPC-associated genetic factors as diagnostic markers to pin-point the start and progress of the cancer in affected individuals. This kind of work will lead to the development of effective detection strategies of the disease.

In addition, UNIMAS researchers are now able to use the latest DNA Microarray system to profile and study the behaviours of NPC-linked genes. When the biological pathways of these genes are well defined, therapeutic drugs can then be designed to cure the cancer or stop it from spreading to other organs. This is better than radio- or chemotherapy, which is usually physically and emotionally debilitating to the patients.

Besides genetic studies, the UNIMAS group is performing using the latest in image analysis technology. The Advanced Information Database Archival (AIDA) system allows documentation of very high quality clinical image for the study and documentation of NPC.

Since the beginning of 2003, UNIMAS researchers have been working closely with scientists at the University of Malaya, Institute of Medical Research, International Medical University and Universiti Putra Malaysia in a joint national top-down 5-year research programme on NPC and oral cancer. This nationwide mega-project is supported by the Ministry of Science, Technology and Innovation via a RM 5 million funding (of which UNIMAS secured RM 1 million) under the Intensified Research in Priority Areas Programme, specifically in the Prioritised Top-Down Category.

Last year, UNIMAS researchers were invited to participate in a 3-year nationwide NPC research programme that was initiated and supported by the Ministry of Health and coordinated by Institute of Medical Research. UNIMAS was



given a grant of about half a million ringgit for the focused studies on the behaviours of selected genetic factors linked to NPC. This initiative also included the historic setting up of the first national NPC tissue bank in Malaysia, with UNIMAS being one of the two centres. With this development, UNIMAS will be one of the internationally-recognised centres for clinical and genetic research on nose and throat cancer.

Bridging the Digital Divide

Centre of Excellence for Rural Informatics
UNIVERSITI MALAYSIA SARAWAK
Initiator of eBario

Management Committee Members: Professor Dr Khairuddin Ab Hamid (Director), Professor Dr Peter Songan (Deputy Director), Associate Professor Dr Alvin Yeo Wee, Dr Poline Bala, Johari Abdullah, Dr Al-Khalid Othman, Associate Professor Narayanan Kulathuramaiyer
Members: Dr Edwin Mit, Dr Jane Labadin, Dr John Phua Chui Leong, Dr Mohd. Omar Abdullah, Mohd Nazri Khairuddin, Nurfauza Jali, Sharin Hazlin Huspi, Dr Soubakeavathi Rethinasamy, Stephanie Chua Hui Li, Suhaila Saee, Associate Professor Dr Tan Chong Eng
Associate Members: Professor Emeritus Dato Dr.Zawawi Ismail, Dr Roger Harris, Jayapragas Gnaniah, Elaine Guat Lien Khoo, Hushairi Zen, Noor Shah Mohd Salleh, Mohamad Imran, Bandan, Martin Anyi

A research centre focusing on rural telecommunication was established at the Faculty of Computer Science and Information Technology (FCSIT) in January 2007. The centre known as the Centre of Excellence for Rural Informatics (COERI) has a two-pronged focus: development of technological infrastructure which comprises telecommunication, energy and IT; and R&D to ensure efficacy of rural development.

The establishment of COERI follows the success of eBario in involving the community in the dissemination of technology to meet their needs. In 2007, the Centre secured a RM4 million Demonstrator's Application Grant Scheme (DAGS) to replicate the eBario model in five other sites in Malaysia.

The group secured six Science Fund grants of over RM800,000 in 2007 and 2008 to conduct research on deployment of wireless networks in rural communities and use of technologies for preserving indigenous languages.

They received funding from the Malaysian Communications and Multimedia Commission to study the effectiveness of ICT literacy programme in Rumah King in Julau district, Sarawak.

In a collaborative work with Sarawak Development Institute and the ICT Unit of the Sarawak Chief Minister's Department, this group designed the Knowledge Readiness Index for Sarawak.

The effectiveness of service providers' in providing rural communities with telecommunication access and the acceptance of the technologies by private users is also part of the on-going work in the centre.

The group was commissioned by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), Economic Planning Unit, Malaysia and National Institute of Public Administration to produce a guidebook on Developing Community e-Centres in Rural Areas.

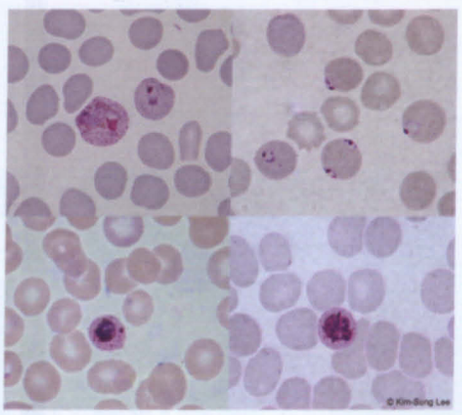
This group is currently involved with the National Institute of Information and Communications Technology, Japan, and the Japanese Space Exploration Agency in the experimental delivery of high-speed, large-volume data transmission to the rural communities through the use of the Wideband Inter-networking Engineering Test and Demonstration Satellite.

MALARIA
New light on an old disease

Researchers: Professor Dr Janet Cox-Sigh, Dr Cyrus Daneshvar, Paul C. S. Divis, Roynston A. Bruce Kini, Julin, Kim Sung Lee, Asmad Matusop, Sunita S. G. Shamsul, Angela Siner, Cheong Huat Tan, Siti Khatijah Zakaria, Associate Professor Dr Mohd Tajuddin Abdullah, Associate Professor Dr Fasihuddin Badruddin, Professor Dr Balbir Singh.


Anthony Sebastian

Malaria is caused by protozoan parasites (Genus: Plasmodium) transmitted by female Anopheline mosquitoes. There are over 100 species of Plasmodium divided into groups known to infect primates, rodents, birds and reptiles. The four species known to cause malaria in humans are *Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae* and *Plasmodium ovale.*


© Kim-Sung Lee

Malaria diagnosis is based on a history of fever, chills and rigor with microscopy confirmation of malaria parasites inside the red blood cells of infected people. All except P. ovale are transmitted in Southeast Asia and malaria control programmes have been successful in reducing the number of reported malaria cases per year in these region, particularly in Malaysia.

Looking beyond the obvious

In the Kapit Division of Sarawak a focus of *P. malariae*, causing unusual clinical features in patients, sparked our interest. A preliminary study on plasmodium DNA extracted from the blood of eight such patients from Kapit Hospital revealed that they were not infected with *P. malariae* but with *P. knowlesi*, a malaria parasite known to infect long-tailed and pig-tailed macaques.

Since the publication of these preliminary findings in 2004, our research team and other researchers in the region have discovered human cases of P. knowlesi acquired across Sarawak, Sabah, Peninsular Malaysia, Singapore, Philippines, Thailand and Burma.

Previously there were no clinical descriptions of *P. knowlesi* malaria in the medical text books and only recently, as a direct result of the work carried out in UNIMAS, has knowlesi malaria been mentioned.

Knowlesi malaria – the disease

Unlike P. malariae which replicates slowly over three days, P. knowlesi replicates every 24 hours, high parasite counts are achieved in a short space of time and it is potentially serious.

Until now severe knowlesi malaria was unheard of. Severe knowlesi cases in Sarawak, that we confirmed using DNA-based technology, were either misdiagnosed as the milder P. malariae or the potentially severe P. falciparum. Again because of the lack of information on severe knowlesi malaria, causes other than malaria had been implicated to explain the severity of symptoms in some of these patients.

Knowlesi malaria – the reservoir

In the eight years since the beginning of the studies on P. knowlesi in humans in Sarawak, we have shown that human infections are associated with spending time in the forest and forest fringe areas. Long-tailed and pig-tailed macaques are reported to be the natural hosts of P. knowlesi. Our study on the macaques in the Kapit Division showed that a large proportion of them were infected with P. knowlesi parasites. They were most likely the reservoir of P. knowlesi in this district. However, the possibility of a human-to-human transmission by mosquitoes cannot be completely ruled out. Therefore, part of our ongoing research is to better understand the demographic and evolutionary history of P. knowlesi parasites in Sarawak.

The Malaria Research Centre receives funding from The Wellcome Trust (UK), the Malaysian Ministry of Science Technology and Innovation and University Malaysia Sarawak. The researchers have strong collaborative links with The Sarawak State Department of Health and hospitals throughout Sarawak.

PRODUCT AND TECHNOLOGY TRANSFER

Jathropha curcas: Biofuel and Medicinal Application

Researcher:
Associate Professor Dr Kamarul-Ain Mustapha
Faculty of Resource Science and Technology

Jathropha curcas (Jarak pagar) is a perennial shrub. The plant can grow on land considered inhabitable by other plants, even on gravelly, sandy and saline soils, and can continue to produce seeds for the next 35-40 years. *J.curcas* was brought to Malaysia by the Japanese during the Second World War where the oil derived from its seeds was used as fuel for their combat vehicles and the leaves were used to heal their wounded soldiers.

UNIMAS is currently working on a project with a local commercial company (Alam Widuri Biotech Sdn Bhd) to explore the commercial viability of *J. curcas* as an alternative plant for large scale production of biofuels in the State of Sarawak, Malaysia.

The research areas include identification of high yield plant clones through selection and cross-breeding, effect of soil conditions (in various divisions within Sarawak) on its growth and production rates, development of tissue culture and micropropagation technique for mass propagation of the selected clones, and the pharmaceutical potential of this plant.

Previous studies have shown that the oil can be combusted without being refined, burnt with clear, smoke-free flame and has been tested as fuel for simple diesel engine.

Apart from its biofuel potential, it also contains natural chemical compounds believed to have anti-cancer properties. It is traditionally used as an external remedy for skin diseases and rheumatism. The oil, rich in nitrogen, phosphorus and potassium, can be used as organic fertilisers as well as sore-relief for domestic livestock.

Sago Effluent: Biofuel and Health Supplements

Researcher:
Professor Dr Kopli Bujang
Faculty of Resource Science and Technology

Production of biofuel from food sources has drawn criticism from various quarters for feeding into the world's food supply. We, therefore, have shifted our focus to using sago waste solids to ensure sustainability.

Following the award of the Techno-Fund research grant in April 2007, and from the first payment of RM2 million in August 2007, our group has since established a complete bench-plant at the Faculty of Resource Science and Technology, UNIMAS. This is in preparation for the pilot plant, currently being constructed at Kotobuki, Japan and locally in Malaysia under the supervision of AGS Sdn Bhd.

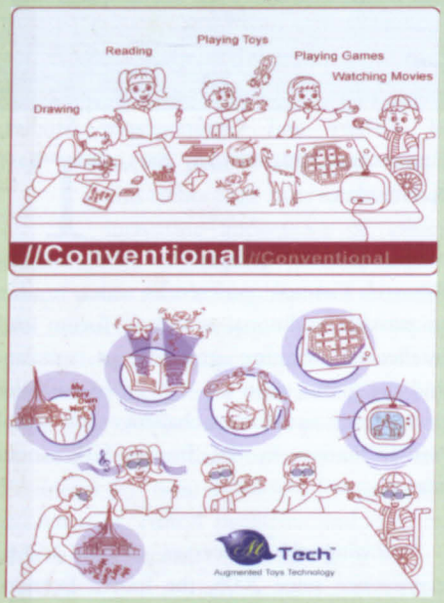
We are now setting parameters for a continuous efficient filtration of sago effluent at a pilot-scale level. Using our modified enzymatic pre-treatment and hydrolysis, it is possible to produce a minimum of 4 tons/day of fermentable sugars (for biofuels production) from a typical sago mill which consumes about 1,000 logs per day. This will definitely reduce the reliance on the supply and cost of sago starch, and minimise the effects of environmental pollution from the sago factories.

We have also established standard parameters for efficient culture of the alga Spirulina on the filtered sago effluent, and our final objective here is to market this product as a halal source of protein and organic health supplements, thus adding further commercial value to a potential pollutant.

Augmented Reality: The Future Educational Technology

Dr Ng Giap Weng
Faculty of Cognitive Sciences and Human Development

Unlike Virtual Reality (VR) that aims at replacing the perception of the world with an artificial one, Augmented Reality (AR) has the goal of enhancing a person's perception of the surrounding world. Being partly virtual and real, the new interface technology of AR is able to display relevant information at the appropriate time and location, and offers many other potential applications. These include aiding in education, training, repair or maintenance, manufacturing, medicine, battlefield, games and entertainment.



AR has many advantages over traditional manual-based and VR models in training and learning applications because users can see and touch the real objects, and at the same time have an interactive guided support to allow the users to work at their own pace. This support includes highlighting and sequencing specific objects in the users' field of view, depending on the task and the users' experience, or presentation of documentation. Furthermore, it would be possible for a remote expert to provide assistance by controlling the information displayed by the system.

The combination of AR technology with the education contents give birth to a new type of automated applications and act to enhance the effectiveness and attractiveness of teaching and learning for students in a real life scene. It promotes 'active' training, both in the psychological and physical sense, and encourages the users to have diverse thinking perspectives, which should prepare them better for their other day-to-day activities.

The Augmented Reality Group has actively explored this new technology in various applications and has won various national awards for its effort. The group is also involved in a number of university-industry research collaboration projects, securing partnership with, among others, MIMOS Berhad, MdeC Sdn. Bhd., and Cubic Engineering Sdn. Bhd.

Molecular Studies on Forest Trees

Dr Ho Wei Seng
Faculty of Resource Science and Technology

The increase in global demand for wood requires increase in forest productivity. There is, therefore, a need to invest more in the research and development (R&D) of high-yield, faster growth and short-rotation plantation forests. Forest biotechnology is essential to achieve this goal.

Biotechnology may augment traditional tree improvement activities by providing adequate tools to tree breeders and supplementing the production of high quality planting materials. Realising the needs, a joint industry-university smart partnership research programme between Sarawak Forestry Corporation and UNIMAS was sealed to provide requisite applied R&D and technical support for the development of plantation forests in the State of Sarawak. Among the research activities that have been identified for this project are forest genomics, biotechnology and tree improvement geared towards enhancing commercial plantation forests as well as a sustainable management of forest resources in Sarawak.

Using state-of-the-art technologies and approaches, development of adequate tools would enable the production of trees that are adapted to local conditions. The Forest Genomics Laboratory at UNIMAS is currently active in developing highly informative and polymorphic genetic markers/tools specific for identifying the genetic makeup of two fast growing indigenous tree species, Kelampayan and Sawih. These markers can then be used for a more accurate means of selecting trees for plantation and improvement activities of the species.

The joint R&D programme is also looking at the genetic transcript to better understand certain important cellular processes such as the genetic control of wood formation in the selected tree species; for example, which genes affect a desirable trait and how variations (mutations) in those genes influence an individual plant. By associating certain genetic makeup with a particular plant characteristic, early selection of improved planting materials for plantation establishment can be achieved at the seedling stage, thus resulting in a better economic return.

NETWORKING

UNIMAS Coordinates IPTA-IPTS Input for SCORE

UNIMAS was assigned by the Ministry of Higher Education to coordinate the involvement of Sarawak-based public and private institutions of higher education (IHE) in the Sarawak Corridor of Renewable Energy (SCORE).

The seven IHE consortium (acronymed as U-SCORE) currently collaborating to jointly provide educational capacity building as well as R&D support for SCORE development are Universiti Malaysia Sarawak (UNIMAS), Universiti Teknologi MARA (UiTM) Samarahan Campus, Universiti Putra Malaysia Bintulu Campus, Curtin University of Technology Sarawak Campus, Swinburne University of Technology Sarawak Campus, Kuching Polytechnic and Mukah Polytechnic.

The terms of reference for U-SCORE include providing projection of expected short, medium and long-term output of trained human resource by each U-SCORE member institutions; identifying and pursuing short, medium and long-term R&D projects relevant to the thrust activities in SCORE; and developing and maintaining a dedicated joint website/portal to facilitate on-line access to sanctioned database by U-SCORE members and other interested parties.

One of the most exciting prospects for U-SCORE institutions is the opportunity to closely collaborate in SCORE-related R&D activities. The inter-institutional collaboration will also include joint application of R&D grants and possible sharing of R&D resources among U-SCORE members as well as with other stakeholders. Contact Person: Prof Dr Murtedza Mohamed– ted@cans.unimas.my

UNIMAS and X-FAB Partnership in Education and Research

Universiti Malaysia Sarawak and X-FAB Sarawak Sdn. Bhd. have recently signed a Memorandum of Agreement (MoA) to collaborate on the Graduate Diploma in Microelectronics on the 24th August 2007.

The Graduate Diploma in Microelectronics is a follow-up to the Certificate and Short Courses Programmme offered by the Department of Electronics Engineering, UNIMAS for X-FAB Sarawak which began in 2004. Symbiotically designed, it aims to provide opportunities for X-FAB staff to broaden their knowledge and skills as well as joint research between UNIMAS and X-FAB in the field of microelectronics. The first batch of X-FAB staff began their 17-month programme on 11 August 2007.

In terms of research collaboration in the area of Integrated Circuit (IC) Design, the Faculty of Engineering, UNIMAS and Integrated Circuit Design Services (ICDS), a subsidiary of X-FAB are currently working on the design and fabrication of the Monolithic IC Transformer respectively. Contact Person: Assoc Prof Dr Wan Hashim Wan Ibrahim – wiwhashim@feng.unimas.my

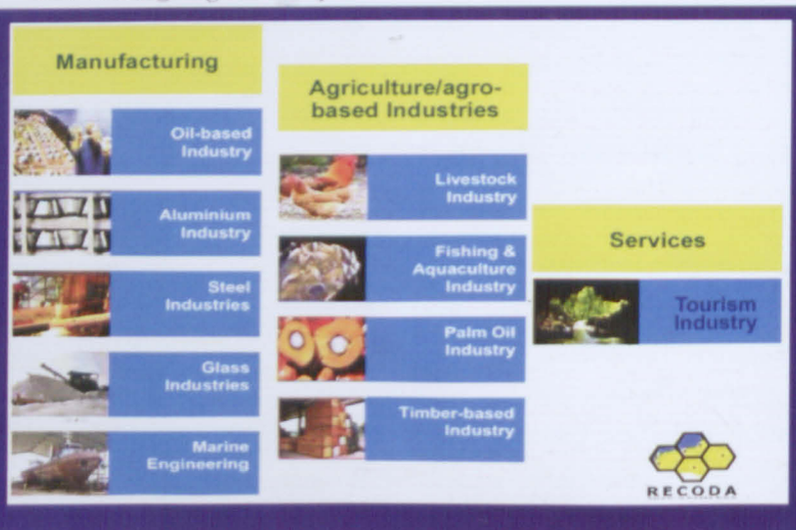
Borneo - Kalimantan Scholars Network for Studies on Social Transformation

This networking of academics was initiated by the Institute of East Asian Studies and Faculty of Social Sciences, UNIMAS, Faculty of Social and Political Sciences, Universitas Tanjungpura, Pontianak, West Kalimantan; Faculty of Social and Political Sciences, Universitas Lambung Mangkurat, Banjarmasin, South Kalimantan and Faculty of Fishery and Oceanography Studies, Universitas Mulawarman, Samarinda, East Kalimantan.

Intended to complement the Borneo Research Council conferences series, it aims to provide additional academic forum and intellectual meeting ground for scholars and the public, who are concerned with the past trends and future challenges of social transformation in the Borneo-Kalimantan region.

Following the successes of its annual conference since 2005, the fourth Borneo-Kalimantan Intervarsity Conference was recently hosted by Universitas Mulawarman, Samarinda, East Kalimantan, Indonesia on the 24-25 of June, 2008. The theme of the conference this year was "Social Transformation of the Borneo-Kalimantan Rural and Coastal Communities: The Issues". Contact Person: Prof Abd Halim Ali – aahalim2@ieas.unimas.my

Priority Industries Promoted by SCORE



STAKEHOLDER SPEAKS

This column offers an opportunity for UNIMAS associates and stakeholders to express their opinions and provide feedback on R&D and related matters at UNIMAS.

IMPORTANCE OF CODE OF ETHICS EDUCATION FOR ENGINEERS

Ir Haji Zawawi Haji Embong
Chief Executive Officer
Sarahill Consulting Sdn Bhd
Immediate Past Chairman
The Institution of Engineers Malaysia
Sarawak Branch
The Association of Consulting Engineers
Malaysia Sarawak Branch

The fast pace of change in science and technology have resulted in an increasing importance of ethical issues in the engineering profession.Some ethical issues substituting imported materials and services for projects and increasing productivity in manufacturing for the sake of cost-savings. Engineers must be equipped to fulfill their obligations to the public, to their profession and to the employers and clients. Engineers first need to learn to recognize the existence of ethical problems and then be able to solve them.

Engineers are the integral and important part of the community. Engineers or builders of the past commanded an elitist position in society. Currently engineers are considered not as good as doctors, lawyers or architects. Perhaps it is due to the team approach of the engineers against the one-to-one relationship of the other professionals. While the doctor can bury his mistake, the lawyer can hide behind the judge and the architect can beautify his mistakes with a bit of landscape architecture, the engineers remains liable for the entire length of his life or the life of the project.

The engineering profession is no longer attracting the brighter students. There is the perception that engineering does not possess much money making power. It is considered a tough course to go through. The entire image of engineers needs revamping. They should serve in more conspicuous activities, highlight their community service projects, emphasize more on successes rather than failures and meet society's needs and requirements. To a certain measure the ethical response and behaviour of the engineer does affect the perception of the public towards the engineering profession and the general image of the engineer.

In the past, engineering students at Institutes of Higher Learning(IHLs) were required to take the subject "Engineer in Society" where the topics of Ethics in Engineering was usually covered. In the last couple of years this subject has been replaced by "Moral and Ethics in Engineering".

For a graduate engineer to become a professional engineer, general knowledge on Code of Ethics and Regulations is needed. Graduate engineers registered with the Board of Engineers Malaysia (BEM) after 1 January 2005 are required to attend the mandotary course while they are undergoing the necessary training before sitting for the Professional Interview (PI) conducted by the Institution of Engineers Malaysia (IEM) or the Professional Assessment Examination (PAE) conducted by BEM.

BEM stresses life long liability of the engineer, and harmony among all parties with a win-win situation for clients, consultants and contractors are emphasized. The role of the engineer in active areas of construction like survey and site investigation, site preparation, installation, progress reporting, testing and acceptance, and operation and maintenance are examined. Issues related to the use of materials, savings from creative and innovative ideas and procedures as opposed to cost-cutting, training and utilization of labour are also covered.

Other pertinent issues examined are welfare of workers, health, safety and environmental aspects, and profit versus quality. The guiding ethical principle in the construction industry must necessarily touch upon the issues of taking reasonable care in the protection of life, property and the environment as well as optimum and efficient use of available resources towards sustainability.

In conclusion, although much has been done to bring ethics into engineering education, a lot more effort is still required. Ethical elements have to be integrated into all subjects whether at school or at the IHLs, and ethical procedures and practices and related issues must be treated as part and parcel of the daily work of the engineer. The general image of the engineer will be improved and so will his mobility and integrity.

" While the doctor can bury his mistake, the lawyer can hide behind the judge and the architect can beautify his mistakes with a bit of landscape architecture, the engineers remains liable for the entire length of his life or the life of the project."

RESEARCH TOOLS AND TECHNOLOGIES

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

Nuclear Magnetic Resonance Spectroscopy (NMR) is a technique that exploits the magnetic properties of certain nuclei. The most important applications for the organic chemist are 1H- and 13C-NMR spectroscopy. Basically, the number of signals in a 13C-NMR provides information on how many different kinds of carbons a compound has, whereas the number of signals in a 1H- NMR tells how many different kinds of hydrogen the compound has. Simple analysis of a 1-D NMR spectrum can provide information on the number and type of chemical entities in a molecule. It can be used to study mixtures of analytes, understand dynamic effects such as change in temperature as well as the reaction mechanisms. In addition, complex molecules such as proteins and nucleic acids can be analysed by 2-D NMR techniques. Today's NMR spectrometers operate at frequency between 60 and 900 MHz and the one in UNIMAS operates at 500 MHz. For further information and inquiries regarding this facility, please contact Prof. Dr. Lau Seng (Department of Chemistry) at 082-583025.

13C-NMR spectroscopy

MICROARRAY SCANNER

In April 2008, Faculty of Resource Science and Technology (FRST) acquired a complete Microarray Scanner system (GenePix 4000B), which is now stationed in the Immunology Laboratory at the Department of Molecular Biology. The Microarray Scanner is a high-end DNA-chip scanner capable of scanning and documentating tens of thousands of genes (or gene fragments) in a microarray platform. This equipment and its associated technology is one of the latest systems in gene expression analysis. It is one of the most important forms of analysis for those in molecular biology. The technology extends to those who study plants, microorganisms, and animals; and is amenable for research or innovation in agriculture, health and medical sciences, and enviromental biotechnologies. The Microarray Scanner comes with a computer workstation that is complete with the latest version of the software that allows high resolution array image documentation and standard array analysis. For further information and inquiries regarding this facility, please contact Ms. Ting Woei (Science Officer of FRST) at 082-583052.

SEMINARS AND CONFERENCES

International Symposium and Workshop on Tropical Peatland

This is a follow-up to the first International Symposium and Workshop on Tropical Peatlands organised in Yogyakarta, Indonesia on 25-29 August 2007. This year's theme will take on "Peatland Development: Wise Use and Impact Management" and will be held from 19-22 August 2008 at Hilton Hotel, Kuching, Sarawak. It will be jointly organised by UNIMAS, Ministry of Planning and Resource Management (Sarawak), Malaysian Agricultural Research & Development Institute (MARDI); in collaboration with CARBOPEAT and in partnership with International Peat Society (IPS). It will provide an opportunity to present the latest data and information on tropical peatlands and their wise use. It will also deliberate on impact mitigations, policy guidance, strategies for implementation, as well as legal and institutional issues involving government agencies in Southeast Asia and the EU, International Conventions, industry and local communities.

Formal Methods Workshop 2008 (FM '08)

The Formal Methods Workshop 2008 (FM '08) was an international workshop on Formal Methods organised by the Faculty of Computer Science and Information Technology, UNIMAS. It was conducted by renowned researcher, Professor Dr. Peter Gorm Larsen from Aarhus (Denmark). It was held from 15 to 16 May 2008. It showcased the latest collaboration platforms for discourse trends in formal methods and their application, as well as tools and techniques used. Workshop topics included formal methods syntax and semantic, formal methods support tools and formal validation and verification on software models.

The 6th International Malaysian Studies Conference (MSC6)

Organised by the Malaysian Social Science Association and the Faculty of Social Sciences, UNIMAS, MSC6 will be held at Crown Plaza Hotel, Kuching, Sarawak from 5-7 August 2008. The primary objective of the biennial Malaysian Studies Conference (MSC) is to bring together scholars for the purpose of exchange. It also aims to analyse issues and problems in contemporary Malaysia and compare the Malaysian experience with that of neighbouring countries. Another objective of the MSC is to examine the state of Malaysian studies and to suggest ways for its advancement. The theme of MSC6 is "Engaging Malaysian Modernity: 50 Years and Beyond".

Malaysian Finance Association 10th Annual Conference 2008

The 2008 Malaysian Finance Association Conference was jointly organised by the Malaysian Finance Association and the Faculty of Economics and Business, UNIMAS. The conference aimed to provide a platform for the exchange of ideas, enhance networking and promote collaboration amongst academicians and practitioners. This year's theme was "Strengthening Malaysia's Position as a Vibrant, Innovative and Competitive Financial Hub". The conference was held on 5-6 June 2008 at Holiday Inn, Kuching, Sarawak.

2nd Engineering Conference (EnCon 2008)

The 2nd Engineering Conference (EnCon 2008) is organised by the Faculty of Engineering, UNIMAS. The main objectives are to promote international cooperation and technological progress in infrastructure development and management and to provide opportunities for engineers, academicians and researchers to exchange ideas. The theme of the conference is "Sustainable Engineering Infrastructure Development and Management". It will be held at Crown Plaza Riverside Hotel, Kuching, Sarawak from 18-19 December 2008.

Some of the participants of the 4th Borneo-Kalimantan Intervarsity Conference was recently hosted by Universitas Mulawarman, Samarinda, East Kalimantan, Indonesia on the 24-25 of June, 2008.

PUBLICATIONS

The following are books and selected international journal papers written by the academic staff of UNIMAS, published or released between December 2007 to July 2008.

Books

Rusli Ahmad, 2008. Cognitive processing system in performance appraisal. Penerbit Unimas, Kota Samarahan.

International Journal Papers

Azman I., Mohd, N.S., 2007. Relationship between Compensation Communication System and Job Satisfaction: Does Procedural Justice Act As a Conditional Role? International Journal of Management Studies. 14(1), 121-142.

Azman, I., Hayazi, A.R., Nur, F.M.Y., 2007. Relationship between Participation in Pay Systems and Job Commitment: Does Procedural Justice Act As an Interacting Variable? Journal of Social and Humanity. 1(02), 125-137.

Law, P.L., Wong, N.H., Lai, S.H., 2007. Field Tests on a Grease Trap Effluent Filter International Journal of Environmental Science Technology 4(3): 345-350.

Bustami, R.A., Bessaih, N., Bong, C.H.J., Suhaili, S., 2007. Artificial Neural Network for Precipitation and Water Level Predictions of Bedup River. IAENG International Journal of Computer Science
34(2):228 – 233.

Taib, S.N.L., Craig, W.H., 2007. Application of Horizontal Slice Method (HSM) on Soil Nailed Slopes The HKIE Transactions, Special Issue: The HKIE Outstanding Paper Award for Young Engineers/Researchers 2007 14(4): 56-62.

Hong, K.S., Julia Lee, A.C., 2008. Postgraduate students' knowledge construction during asynchronous computer conferences in a blended learning environment: A Malaysian experience. Australasian Journal of Educational Technology. 24(1). (Available online at http://www.ascilite.org.au/ajet/ajet24/hong.pdf.)

Teh, C.S., Lim, C.P., 2008. An Artificial Neural Network Classifier Design Based-on Variable Kernel and Non- Parametric Density Estimation. Neural Processing Letters. 27(2): 137-151.

Baini, R., Langrish, T.A.G., 2008. An Assessment of the Mechanisms for diffusion in the drying of Bananas. Journal of Food Engineering. 85(2): 201- 214.

Lai, S.H., Bessaih, N., Law, P.L., Ab. Ghani, A., Zakaria, N.A., Mah, Y.S., 2008. Determination of Apparent and Composite Friction Factor for Flooded Equatorial Natural Rivers. International Journal of River Basin Management. 6 (1): 3-12.

Lai, S.H., Bessaih, N., Law, P.L., Ab. Ghani, A., Zakaria, N.A., Mah, Y.S., 2008. Discharge Estimation for Equatorial Natural Rivers with Overbank Flow. International Journal of River Basin Management. 6(1): 13-21.

Almarouf, S.H., Law, P.L., Lau, H.H., Baharun, A., 2008. Optimum Coalescence Plate Arc Length for Removal of Oil Droplets from Wastewaters. Journal of Engineering Science and Technology. 2(3): 247-259.

Hasan, M., Stokes, J., Looney, L., Hashmi, M.S.J. 2008. Design and Optimisation of a Multi-Powder HVOF Deposition Process. Journal of Surface and Coatings Technology. 202 (4): 3215-3220.

Cox-Singh, J., Davis, T.M.E., Lee, K.S., Shamsul S.S.G., Matusop, A., Ratnam, S., Rahman, H.A., Conway, D.J., Singh, B., 2008. Plasmodium knowlesi malaria in humans is widely distributed and potentially life-threatening. Clinical Infectious Diseases. 46 : 165-171.

Phang, C., Phang P., 2008. Modified Fast and Exact Algorithm for Fast Haar Transform. International Journal of Computer Science and Engineering. 2 (2): 55 - 58.

Tan, C.H., Vythilingam, V., Chan, S.T., Matusop, M., Singh, B., 2008 Bionomics of Anopheles latens in Kapit, Sarawak, Malaysian Borneo in relation to the transmission of zoonotic simian malaria parasite Plasmodium knowlesi. Malaria Journal. 7: 52.

Luchavez, J., Espino, F.E., Curameng, P., Espina, R., Bell, D., Chiodini, P.L., Nolder, D., Sutherland, C.J., Lee, K-S., Singh, B., 2008. Human infections with the simian malaria parasite, Plasmodium knowlesi, in Palawan, Philippines. Emerging Infectious Diseases. 14: 811-813.

Ma, X.R., Sim, E.U.H., Balraj, P., Lim, P., Jamal, R. 2008. Overexpression of WNT2 and TSG101 in colorectal carcinoma. Tropical Biomedicine, 25(1): 46-57.

Zulaikah M., Nazlina I., Ismail A. 2008. Penindasan Terpilih Gen-Gen Staphylococcus aureus Rintang Metisilin yang dirawat dengan Ekstrak Metanomelastoma malabathricum. Sains Malaysiana 37(1): 107-113

Nadarajan, S. 2007. The use of repetitive structures among Malaysians, The International Journal of Language, Society and Culture, 22, 29- 38.

Ting, S. H. 2007. Is teacher education making an impact on TESL teacher trainees' beliefs and practices of grammar teaching. English Language Teacher Education and Development Journal. 10, 42-62.

Azman I., Sofiah B., Muhammad M.A., Suhaimi S., Shahrul N.S. 2007. Relationship between motivation to learn, supervisor support and supervisor communication in training programs, and transfer of competency: A moderating model testing approach. Journal of Social and Humanity, 2(3), 239-252.

Muhammad Madi Abdullah, Jegak Uli and Azman Ismail. (Jun 2007). Relationship between critical soft factors and organizational performance: a case of Malaysian electrical and electronics firms. Journal of Social and Humanity, 2(3), 203-217.

RESEARCH CONTACTS

The following are contact emails and telephone extensions (082-581000 through operator; or 082-58 followed by the extension number for direct dialing) of officers/researchers in-charge of various research disciplines at UNIMAS.

Research Contacts

Vice Chancellor
Prof Dr Khairuddin Ab Hamid
khair@cans.unimas.my (ext: 1111)

Deputy VC (Research & Innovation)
Prof Dr Murtedza Mohamed
ted@cans.unimas.my (ext: 1122)

Faculty of Resource Science & Technology
Prof Dr Wan Sulaiman Wan Harun
whwsulaiman@frst.unimas.my (ext: 3180)

1 Molecular Biology
Assoc Prof Dr Edmund Sim Ui Hang
uhsim@frst@unimas.my (ext. 3185)

2 Plant Science and Environmental Ecology
Assoc Prof Dr Cheksum Tawan
cheksum@frst.unimas.my (ext: 3186)

3 Zoology
Assoc Prof Dr Mohd Tajuddin Abdullah
tabdulla@frst.unimas.my (ext: 3189)

4 Chemistry
Assoc Prof Dr Fasihuddin Badruddin Ahmad
bfasih@frst.unimas.my (ext: 3020)

5 Aquatic Sciences
Dr Siti Akhmar Khadijah Ab Rahim
arakmar@frst.unimas.my (ext: 3190)

Institute of BioDiversity & Environmental Conservation
Assoc Prof Dr Andrew Alek Tuen
aatuen@ibec.unimas.my (ext: 2295)

Faculty of Computer Science & Information Technology
Johari Abdullah
ajohari@fit.unimas.my (ext: 3767)

1 Computational Sciences and Mathematics
Dr Shapiee Abdul Rahman
sar@fit.unimas.my (ext:3664)

2 Computing and Software Engineering
Dr Edwin Mit
edwin@fit.unimas.my (ext: 3636)

3 Computer System & Communication Technology
Assoc Prof Dr Tan Chong Eng
cetan@fit.unimas.my (ext: 3776)

4 Information System
Sharin Hazlin Huspi
hshazlin@fit.unimas.my (ext:3772)

Faculty of Engineering
Assoc Prof Dr Wan Hashim Wan Ibrahim
wiwhashim@feng.unimas.my (ext:3325)

1 Mechanical Engineering
Syed Tarmizi Syed Shazali
starmizi@feng.unimas.my (ext: 3268)

2 Civil Engineering
Dr Siti Noor Linda Taib
tlinda@feng.unimas.my (ext: 3337)

3 Electronics Engineering
Norhuzaimin Julai
jnorhuza@feng.unimas.my (ext: 3339)

4 Chemical Engineering
Dr Rubiyah Hj Baini
rubiy@feng.unimas.my (ext: 3338)

Faculty of Medicine & Health Sciences
Tan Sri Datu Prof Dr Mohd Taha Arif
amtaha@fmhs.unimas.my (082-292111)

1 Surgery
Assoc Prof Dr Tin Win
wtin@fmhs.unimas.my (082-292207)

2 Medicine
Dr Rohana Abdul Ghani
grohana@fmhs.unimas.my (082-292211)

3 Paraclinical Sciences
Dr Lela Su'ut
slela@fmhs.unimas.my (082-292269)

4 Basic Medical Sciences
Prof Dr Vijeyaratnam Thambyrajah
vijitham@fmhs.unimas.my (082-292303)

5 Orthopedics
Prof Dr Pan Kok Long
klpan@fmhs.unimas.my (082-292202)

6 Pediatrics
Dr Mohamed Ameenudeen B.A.Sultan Abdul Kader
akmameenudeen@fmhs.unimas.my (082-292259)

7 Obstetrics and Gynaecology
Dr Awi Idi
iawi@fmhs.unimas.my (082-292263)

8 Community Medicine and Public Health
Assoc Prof Dr Kamaluddin Bakar
bkamaluddin@fmhs.unimas.my (082-292238)

9 Nursing
Jane Buncuan
jbuncuan@fmhs.unimas.my (082-292284)

10 Ophthalmology
Assoc Prof Dr Chua Chung Nen
cnchu@fmhs.unimas.my (082-292221)

11 Psychological Medicine
Prof Dr Mohd Fadzillah Abd Razak
armfadzillah@fmhs.unimas.my (082-292113)

12 Family Medicine
Dr Lee Ping Yien
bylee@fmhs.unimas.my (081-292247)

13 Radiology
Dr Ahmad Faizal b Mohammad Ali
maafaizal@fmhs.unimas.my (082-292270)

Faculty of Applied & Creative Arts
Assoc Prof Mohd Fadzil Abdul Rahman
fadzil@faca.unimas.my (ext: 1436))

1 Design Technology
Dr Nazlina Shaari
snazlina@faca.unimas.my (ext: 1343)

2 Visual Arts and Technology
Zulkalnain Zainal Abidin
nine@faca.unimas.my (ext: 1342)

3 Performing Arts and Production Technology
Abdul Riezal Dim
driezal@faca.unimas.my (ext: 1344)

4 Liberal Arts
Qistina Donna Juleng Lee
idjuleng@faca.unimas.my (ext: 1321)

Faculty of Cognitive Science & Human Development
Dr Shahren Ahmad Zaidi Adruce
azshahren@fcs.unimas.my (ext: 1569)

1 Cognitive Science
Kartini Abd Ghani
gkartini@fcs.unimas.my (ext: 1560)

2 Human Resource Development
Dr Azman Ismail
iazman@fcs.unimas.my (ext: 1558)

3 Counselling
Salmah bt Mohamad Yusof
mysalmah@fcs.unimas.my (ext: 1531)

Faculty of Economics & Business
Prof Dr Shazali Abu Manshor
mshazali@feb.unimas.my (ext: 2280)

1. Economics
Assoc Prof Dr Ahmad bin Shuib
shahmad@feb.unimas.my (ext: 2428)

2. Business
Prof Dr Abu Hassan Bin Md Isa
miahassan@feb.unimas.my (ext: 2356)

Faculty of Social Sciences
Assoc Prof Dr Mutalip Abdullah
aamutalip@fss.unimas.my (ext: 2255)

1. Sociology and Anthropology
Dr Ling How Kee
ihkee@fss.unimas.my (082-679117)

2. Politics and International Relations
Dr Neilson Ilan Mersat
mnilan@fss.unimas.my (082-679135)

3. Development Studies
Assoc Prof Dr Spencer Empading Sanggin
spencer@fss.unimas.my (082-679155)

Institute of Community Health & Medicine
Prof Dr Mary Jane Cardosa
jcardosa@ihcm.unimas.my (082-671730/082-582348)

Institute of East Asian Studies
Prof Datuk Dr Abdul Rashid Abdullah
ara@ieas.unimas.my (ext: 2464)

Centre of Language Studies
Dr Soubakeavathi Rethinasamy
rsouba@cls.unimas.my (ext:1749)

Centre of Water Research
Prof Dr Lau Seng
lauseng@frst.unimas.my (ext: 3191)

Malaria Research Centre
Prof Dr Balbir Singh
bsingh@fmhs.unimas.my (ext:082-292256)

Centre for Rural Informatics
Prof Dr Khairuddin Ab Hamid
khair@cans.unimas.my (082-665101)

Centre for Image Analysis & Spatial Technologies
Prof Dr Wang Yin Chai
ycwang@fit.unimas.my (ext: 3796)

U-SCORE

U-SCORE is a consortium of Sarawak-base institutions of higher education (public & private) complementing and participating directly and indirectly in the implementation of SCORE, particularly with respect to the project needs for human capital, R&D and extension services.